Glossary of Key Terms:

Autopoiesis
The process by which a system regenerates itself through the self-reproduction of its own elements and of the network of interactions that characterize them. An autopoietic system renews, repairs, and replicates or reproduces itself in a flow of matter and energy. Note: from a strictly Maturanian point of view, autopoiesis pertains exclusively to biological/living systems.

Boundaries
The parametric conditions that delimit and define a system and set it apart from its environment.

Catastrophe
A mathematical description of a sudden and/or radical change in form, or a similar qualitative change in condition; relates to the theories of Réne Thom.

Closed
A state of being isolated from the environment. No system can be completely closed (or else we could not perceive it): there are only various degrees of closure.

Cognitive map
The mental image or representation made by human individuals and groups of their environment and their relationship to it, involving not only the rational aspects of attitudes and behaviors, but also the values and belief components that shape human perception. [See *culture*.]

Community
A group of two or more individuals with a shared identity and a common purpose committed to the joint creation of meaning.

Complexity
A systemic characteristic that stands for a large number of densely connected parts and multiple levels of embeddedness and entanglement/intertwingling. Not to be confused with complicatedness, which denotes a situation or event that is not easy to understand, regardless of its degree of complexity.

Culture
That which distinguishes one social group from another, being the set of products and activities through which humans express themselves and become aware of themselves and the world around them. [See *cognitive map.*]

Development
An amelioration of conditions or quality. [See *growth* and *evolution*.]

Dissipative structures
A term coined by Ilya Prigogine to describe complex chemical structures undergoing the process of chemical change through the dissipation of entropy into their environment, and the corresponding importation of "negentropy" from their environment. Also known as *syntropic systems.*

Embeddedness
A state in which one system is nested in another system.

Emergence
The appearance of novel characteristics exhibited on the level of the whole ensemble, but not by the components in isolation.

Entanglement
A state in which the manner of being, or form of existence, of one system is inextricably tied to that of another system or set of systems.

Entropy	In thermodynamics, a measure of energy that is expended in a physical system, does no useful work, and tends to decrease the organizational order of the system.
Environment	The context within which a system exists. It is composed of all things that are external to the system, and it includes everything that may affect the system and may be affected by it at any given time.
Evolution	A tendency toward greater structural complexity and organizational simplicity, more efficient modes of operation, and greater dynamic harmony. A cosmic process specified by a fundamental universal flow toward ever increasing *complexity* that manifests itself through particular events and sequences of events that are not limited to the domain of biological phenomenon but extend to include **all** aspects of change in open dynamic systems with a throughput of information and energy. In other words, evolution relates to the formation of stars from atoms, of *Homo sapiens* from the anthropoid apes, as much as to the formation of complex societies from rudimentary social systems.
Evolutionary Development	A form of *sustainable development* concerned with the study of human change in an evolutionary context.
Evolutionary Leadership	The form of leadership required for successful sustainability management in an evolutionary context.
Evolutionary Learning Community (ELC)	A *community* that strives toward sustainable pathways for evolutionary development in synergistic interaction with its milieu, through individual and collective processes of empowerment and evolutionary learning. ELCs do not adapt their environment to their needs, nor do they simply adapt to their environment. Rather, they adapt *with* their environment in a dynamic of mutually sustaining evolutionary co-creation.
Evolutionary Systems Design (ESD)	A form of *systems design* that responds to the need for a future-creating design praxis that embraces not only human interests and life-spans but those on planetary and evolutionary planes as well. The primary vehicle for the implementation of ESD is the *Evolutionary Learning Community* (ELC).
Feedback	A process by which information concerning the adequacy of the system, its operation, and its outputs are introduced into the system. *Negative feedback* tells us that there is a discrepancy between what the system produces and what it should produce. It tells us that we should change something in the system so that we can reduce the deviation from the norms stated in the output model of the system. *Positive feedback,* on the other hand, tells us that the whole system should change, that we should increase the deviation from the present state, and change the output model.
Feedforward	A process, akin to feedback, that informs current operations with future ideals and adjusts the output model accordingly.
Function	Denotes actions that have to be carried out in order to meet systems requirements and attain the purpose(s) of the system.
Functions/structure	A systems model that organizes in relational arrangements

model	systems concepts and principles that present an image of a system in a given moment of time. A metaphor for this is a "still-picture" or "snapshot" of the system.
General System Theory	The concepts, principles, and models that are common to all kinds of systems and the isomorphisms between and among various types of systems.
Growth	An increase in size or quantity. [See *development* and *evolution*.]
Heterarchy	An ordering of things in which there is no single peak or leading element, and which element is dominant at a given time depends on the total situation; often used in contrast to hierarchy.
Hierarchy	A vertical arrangement of entities (systems and their subsystems).
Holarchy	A concept invented by Arthur Köestler to describe behavior that is partly a function of individual nature and partly a function of the nature of the embedding system.
Holism	A unitary and integral descriptive approach for generating explanatory principles of whole systems. Attention is focused on the emergent properties of the whole rather than on the behavior of the isolated parts. By drawing attention to the system level characteristics of an intact entity and not to the sub-system level characteristics of its components, the approach involves and generates appreciative, experiential, and intuitive understanding.
Hologram	A three-dimensional photograph created by the interference pattern of two laser beams with the result that each discrete aspect of the image contains all the information necessary to reconstruct the entire image so that, in effect, the whole is contained in all the parts.
Human Activity Systems	Designed social systems organized for a purpose, which they attain by carrying out specific functions.
Learning	A lifelong process that a) challenges the learner's perspective and facilitates the expansion of his/her worldview; b) promotes human fulfillment; c) enables the learner to cope with uncertainty and complexity; and d) empowers the learner to creatively shape change and design the future.
Lowerarchy	A specific type of hierarchy involving a 'bottom up' arrangement of entities such that the few are influenced by the many.
Model building	A disciplined inquiry by which a conceptual (abstract) representation of a system is constructed or a representation of expected outcomes/output is portrayed.
Open	A state and characteristics of that state in which a system continuously interacts with its environment. Open systems are those that maintain their state and exhibit the characteristics of openness previously mentioned.
Organizational learning	A process of developing organizational capacity and human capability to articulate and continuously examine the purposes, underlying perspectives and assumptions, and individual and organizational values in view of the (a) performance of the organization, and (b) the changing characteristics and expectations of the environment(s) in which the organization is embedded.

Paradigm	The set of fundamental beliefs, axioms, and assumptions that order and provide coherence to our perception of what is and how it works; a basic world view; also, example cases and metaphors. [See *cognitive map*.]
Process model	An organized arrangement of systems concepts and principles that portray the behavior of a system through time. Its metaphor is the "motion-picture" of "movie" of the system.
Reductionism	A scientific orientation that seeks to understand phenomena by a) breaking them down into their smallest possible parts: a process known as analytic reductionism, or conversely b) conflating them to a one-dimensional totality: a process known as holistic reductionism.
Subsystem	A major component of a system. It is made up of two or more interacting and interdependent components. Subsystems of a system interact in order to attain their own purpose(s) and the purpose(s) of the system in which they are embedded.
Suprasystem	The entity that is composed of a number of component systems organized in interacting relationships in order to serve their embedding suprasystem.
Sustainable Development	A process of development (individual, societal, or global) can be said to be socially and ecologically sustainable if it involves an adaptive strategy that ensures the evolutionary maintenance of an increasingly robust and supportive environment. Such a process enhances the possibility that human and other life will flourish in this planet indefinitely.
Sustainability Management	The creative and responsible stewardship of resources — human, natural, and financial — to generate stakeholder value while contributing to the well-being of current and future generations of all beings.
Synchrony	Also *synchronicity*. In engineering; concurrence of periods and/or phases; simultaneity of events or motions: contemporaneous occurrences. In evolutionary systems thinking; a fortunate coincidence of phenomenon and/or of events.
Synergy	The process by which a system generates emergent properties resulting in the condition in which a system may be considered more than the sum of its parts, and equal to the sum of its parts plus their internal and external relationships. This resulting condition can be said to be one of synergy.
Syntony	In evolutionary systems thinking, evolutionary consonance; the occurrence and persistence of an evolutionarily tuned dynamic regime. Conscious intention aligned with evolutionary purpose; more loosely, the embodiment and manifestation of conscious evolution; a purposeful creative aligning and tuning with the evolutionary flows of one's milieu. In traditional radio engineering; resonance.
Syntropy	The process of negentropy-importation. A syntropic system is a *dissipative structure.*
System	A group of interacting components that conserves some identifiable set of relations with the sum of their components plus their

4

	dynamic relationships (i.e., the system itself) conserving some identifiable set of relationships to other entities (including other systems).
System types	The members of a set of classifications that arrange human activity systems according to how open-closed, mechanistic-systemic, unitary-pluralistic, or restricted-complex they are. Differentiated on the four-fold continua, system types include those that are rigidly controlled, deterministic, purposive, heuristic, and purpose-seeking.
System-environment model	A model to examine and define a system in its context and to organize systems concepts and principles that are relevant to system-environment interactions.
Systematic thinking	Any methodical step-by-step approach that is carried out according to a pre-determined algorithm or a fixed plan.
Systemic thinking	A tendency or natural predisposition to think in terms of systemic relationships without necessarily drawing upon systems concepts, systems principles, or systems models. Some examples of areas that incorporate and foster such thinking include permaculture, feminist studies, ecology, and the *I Ching*.
Systems approach	A view that perceives phenomena as a system and deals with problem situations and opportunities that emerge by the application of systems thinking.
Systems design	A decision-oriented disciplined inquiry that aims at the construction of a model that is an abstract representation of a future system.
Systems thinking	An internalized manifestation (in the thinking of individuals or social systems) of systems concepts, systems principles, systems methods, and systems models.
Terrome	A planetary biome: the entire community of life and life support systems, comprised of the global biotic community and prevailing climate, that characterizes a given planet.
Wholeness	In reference to systems, the condition in which systems are seen to be structurally divisible, but functionally indivisible wholes with emergent properties.